AMPEX

AUDIO-VIDEO
SYSTEMS DIVISION

TBC-2B

DIGITAL TIME-BASE CORRECTOR (NTSC)

INSTALLATION AND OPERATION

CATALOG NO. 1809503-01
ISSUED: FEBRUARY 1981

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Issued: February 1981

TBC-2B
DIGITAL TIME-BASE CORRECTOR
(NTSC)

INSTALLATION AND OPERATION

AMPEX CORPORATION
AUDIO-VIDEO SYSTEMS DIVISION

Prepared by

AVSD Technical Publications
Ampex Corporation
401 Broadway
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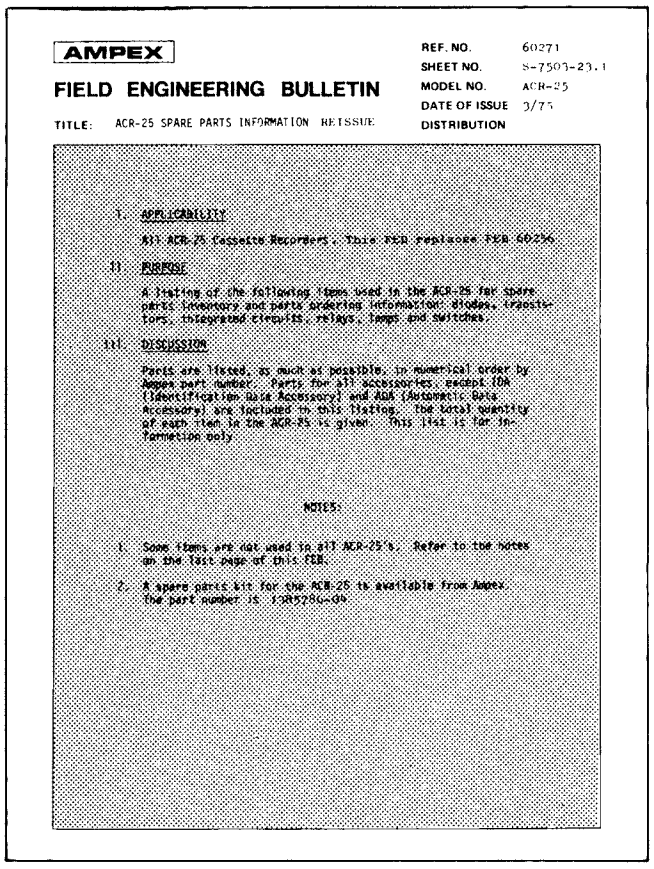
FIELD ENGINEERING BULLETIN SERVICE



AMPEX

FIELD ENGINEERING BULLETIN

TITLE: ACR-25 SPARE PARTS INFORMATION REISSUE

REF. NO. 60271
SHEET NO. S-7503-23.1
MODEL NO. ACR-25
DATE OF ISSUE 3/75
DISTRIBUTION

I. APPLICABILITY

All ACR-25 Cassette Recorders. This FEB replaces FEB 6025%.

II. PURPOSE

A listing of the following items used in the ACR-25 for spare parts inventory and parts ordering information: diodes, transistors, integrated circuits, relays, lamps and switches.

III. DISCUSSION

Parts are listed, as much as possible, in numerical order by Ampex part number. Parts for all accessories, except IDA (Identification Data Accessory) and ADS (Automatic Dots Accessory), are included in this listing. The total quantity of each item in the ACR-25 is given. This list is for information only.

NOTES:

1. Some items are not used in all ACR-25's. Refer to the notes on the last page of this FEB.
2. A spare parts kit for the ACR-25 is available from Ampex, the part number is 1305286-04.

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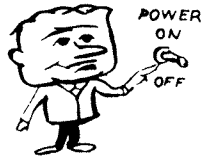
Effective: 1 October 1980

SAFETY AND FIRST AID SUGGESTIONS

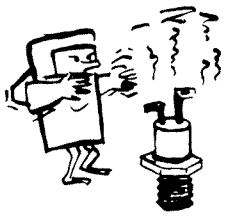
Regardless of how well electrical equipment is designed, personnel can be exposed to **dangerous electrical shock** when protective covers are removed for maintenance or other activities. Therefore, it is incumbent on the user to see that all safety regulations are consistently observed and that each individual assigned to the equipment has a clear understanding of first aid related to electrical hazards.

In addition, the following safety practices must be followed:



1 Do not attempt to adjust unprotected circuit controls or to dress leads with power **on**.

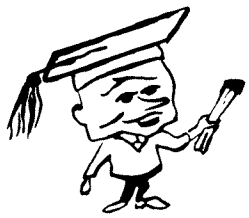
2 Do not touch heavily loaded or overheated components without precaution to avoid burns.



3 Do not assume that all danger of electrical shock is removed when power is off. Charged capacitors can retain dangerous voltages for a long time after power is removed. These capacitors should be discharged through a suitable resistor before any circuit points are touched.

4 Always avoid placing parts of the body in series between ground and circuit points.

5 Remember that some semiconductor cases and solid-state circuits carry high voltages.



6 Don't take chances. Be fully trained. Ampex equipment should be operated and maintained only by fully qualified personnel.

If someone seems unable to free himself while receiving an electrical shock, **turn power off** before attempting to render aid. A muscular spasm or unconsciousness can make a victim unable to free himself from the electrical power.

WARNING

DO NOT
TOUCH VICTIM OR HIS CLOTHING BEFORE
POWER IS REMOVED OR YOU MAY ALSO
BECOME A SHOCK VICTIM

If power cannot be removed immediately, **very carefully** loop a length of dry nonconducting material (such as rope, insulating material, or clothing) around the victim and pull him free of the power. Carefully avoid touching him or his clothing until free of power. Immediately start the appropriate first aid procedures.

GOOD PRACTICES

In maintaining the equipment covered in this manual, please keep in mind the following standard good practices:

1. When connecting any instrument (oscilloscope, waveform monitor, etc.) to a high-frequency output, use the appropriate termination resistor at the input of the instrument, unless the instrument is terminated internally.

2. When inserting or removing printed wiring assemblies (PWAs), cable connectors, or fuses, always turn off power to the affected portion of the equipment. After power is removed, allow sufficient time for the power supplies to bleed down before reinserting PWAs.

3. When troubleshooting, remember that FETs and other metal-oxide-semiconductor (MOS) devices may appear defective because of leakage between traces or component leads on the printed wiring board. Clean the printed wiring board and recheck the MOS device before assuming it is defective.

4. When replacing MOS devices, follow standard practices to avoid damage caused by static charges and soldering.

5. When removing components from PWAs (particularly ICs), use care to avoid damaging PWA traces.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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TBC-2B Digital Time-Base Corrector

SECTION 1
GENERAL INFORMATION

1-1. PURPOSE AND SCOPE OF MANUAL

This manual provides general information, installation, operation instructions, and maintenance and auxiliary data information for the NTSC version of the TBC-2B Digital Time-Base Corrector, Ampex Part No. 1409000.

1-2. CAPABILITIES OF EQUIPMENT

The TBC-2B is a television color time-base correction system designed for use with monochrome or color nonsegmented helical-scan videotape recorders with or without a capstan servo (when equipped with the video processor accessory). Ampex capstan servo recorders in this category include models VPR-2B, VPR-20, VPR-1, VPR-2, VPR-5100E, VPR-5200, VPR-5800, VPR-7800, VPR-7900, and VR-660. The TBC-2B may also be used with capstan-servoed or noncapstan-servoed 3/4-inch U-Standard cassettes and 1/2-inch EIAJ-format VTR's. In the case of recorders that are capstan servoed, the TBC corrects to the reference vertical. In the case of noncapstan-servoed machines, the TBC corrects to the average of the off-tape vertical. The system corrects for timing errors of 10 horizontal lines and provides an output color signal stabilized to within ±2.5 nanoseconds. The output signal can be used (when gen-locked) for fades, lap dissolves, special effects, transfer to film, and dubs to quadruplex or other types of recorders. The high stability of the signal permits multiple generation dubbing.

The TBC-2B includes a sync generator as a standard element of the system. The sync generator supplies sync signals for the TBC-2B when external sync is not available, or it can be gen-locked to a station sync generator.

1-3. PHYSICAL DESCRIPTION

The TBC-2B is a self-contained unit that includes a power supply. The unit mounts in a standard 19-inch rack. An optional cabinet is available.

Depending on the accessories selected, the electronics are contained in up to 15 individual printed wiring assemblies (PWA's) which plug into a single-row card-rack chassis. Table 1-1 lists the standard plug-in PWA's of the system.

Table 1-1. TBC-2B (NTSC) Digital Time-Base Corrector Standard PWA's

PWA	ASSEMBLY NO.	DESCRIPTION
3	1405134	Video Input
4	1409108	Analog-to-Digital Converter
5	1409104	Tape H Comparator
6	1409101	Tape VCO
7	1409094	Memory Control
8	1409122	Serial-to-Parallel Converter
9	1409107	Memory A
10	1409107	Memory B
11	1409107	Memory C
12	—	—
13	1402396	Parallel-to-Serial Converter
14	1405189	Video Output
15	1405186	Sync Generator

Table 1-2. TBC-2B (NTSC) Digital Time-Base Corrector Accessories

KIT	PWA	KIT NO.
Color Processor	2	1405194
Video Processor	16	1405195
Parallel-to-Serial Converter/Velocity Compensator	13	1409080
Serial-to-Parallel Converter/Dropout Compensator	8	1409081
Rack Mount	–	1409084
TBC/VPR-20 Interface Piggyback Board	–	1460189

1-4. FUNCTIONAL DESCRIPTION

The TBC-2B Digital Time-Base Corrector (see Figure 1-1) provides time-base error correction for nonsegmented helical scan videotape recorders. Correction is provided by locking the off-tape video information into digital memory storage in synchronization with a clock derived from the tape video and then reading the information out of memory synchronous with a clock derived from the reference timing. The video information is sampled and digitized before storage and then re-converted to analog form for output from the TBC-2B. The TBC-2B contains input processing, storage, output processing, and timing circuits. The input processing circuits consist of the Video Input PWA, Analog-to-Digital Converter PWA, and Serial-to-Parallel Converter PWA. The storage circuits consist of three identical memory PWA's. The output processing circuits consist of the Parallel-to-Serial Converter PWA and the Video Output PWA. The timing and control circuits consist of the Tape H Comparator PWA, the Tape VCO PWA, the Memory Control PWA, and the Sync Generator PWA.

1-5. ACCESSORIES

The TBC-2B card-rack chassis is prewired to accept the various accessories without modification. The optional accessory PWA's are listed in Table 1-2 and described in the following paragraphs.

1-6. Noncapstan Servo Accessory

The noncapstan servo accessory consists of a single PWA, the Video Processor PWA 16. This accessory allows the TBC-2B to be used with nonsegmented helical scan VTR's without capstan servo. With this accessory, playback from the noncapstan servoed machine is processed in the TBC-2B and dubbed onto a tape recorded on a capstan-servoed VTR. When the dub is played back on the capstan-servoed VTR and processed through the TBC-2B, the signal is of broadcast quality. During the dubbing process, the TBC-2B sync generator is locked to the output of the playback VTR to remove fast or short term time-base errors. The Video Processor PWA 16 separates chrominance from luminance, demodulates chrominance using sync-derived 3.58 MHz, then remodulates the chrominance using a stable crystal oscillator. The chrominance is then re-added to the luminance. The signal produced by the Video Processor PWA can be observed on a color monitor during the dubbing process.

1-7. Dropout Compensator Accessory

The dropout compensator minimizes the effects of dropouts in recorded color or monochrome video signals. When a dropout occurs, luminance and chrominance information from a correctly phased corresponding interval in a previous line is used to replace the missing information. The dropout compensator is contained on a single PWA which replaces the standard PWA 8 with the optional Serial-to-Parallel Converter/Dropout Compensator PWA.

1-8. Velocity Compensator Accessory

The TBC-2B without the velocity compensator corrects the time-base errors during sync and burst time of each horizontal line. The velocity compensator accessory corrects the time-base error during a line, by straight-line compensation between

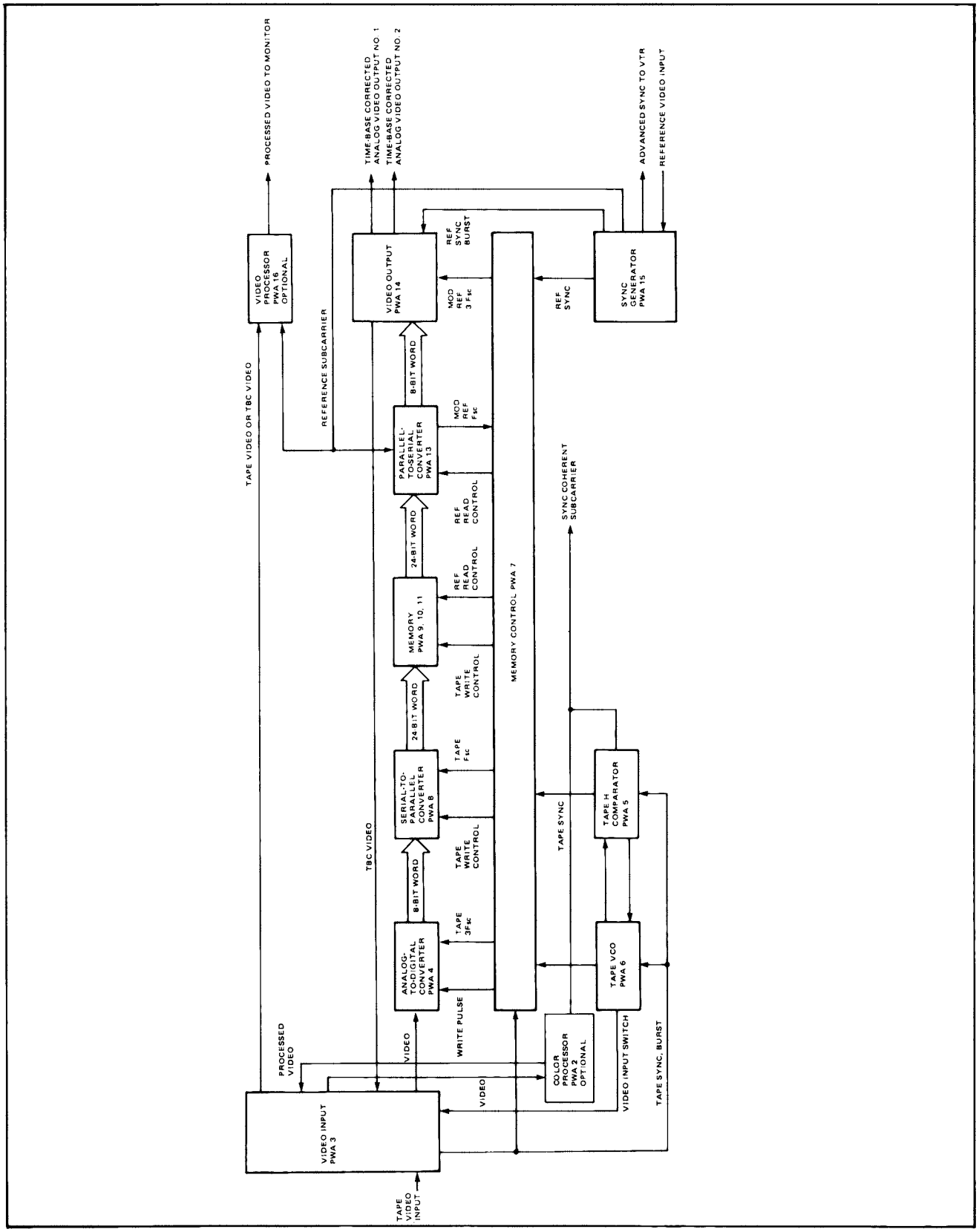


Figure 1-1. TBC-2B System Simplified Block Diagram

the line rate error sampling points. The error signal, generated in the velocity compensator, shifts the clock timing to the digital-to-analog conversion circuits to correct for the velocity error. The velocity compensator accessory is contained on a single PWA which replaces the standard PWA 13 with the optional Parallel-to-Serial Converter/ Velocity Compensator PWA.

1-9. Color Processor Accessory

The color processor accessory permits the TBC-2B to be used with a VPR-2B in reverse slow-motion mode and also allows the TBC-2B to be used with a heterodyne-type color VTR. As with the basic TBC-2B, the VTR must be of the nonsegmented helical scan type. The color processor strips and demodulates the non-sync-coherent chroma information from the video and reinserts the chroma information after remodulation into video that is coherent to the H-sync. The color processor accessory consists of a single PWA, Color Processor PWA 2, which is inserted directly into slot 2 of the TBC-2B card-rack chassis.

1-10. SPECIFICATIONS

Specifications and performance characteristic of the TBC-2B are given in Table 1-3. These specifications are subject to change without notice.

Table 1-3. TBC-2B Specifications

GENERAL		
Size:	19 inches wide X 11 inches high X 18 inches deep (483 mm wide X 279 mm high X 457 mm deep)	
Weight:	80 lb (36.3 kg)	
Power Requirements:	Less than 250W, 100/120 Vac ±10% 60 Hz	
Ambient Operating Conditions:	Temperature:	0° to 45° C
	Humidity:	10% to 90% relative humidity (noncondensing)
VIDEO		
Bandwidth:	Flat (±0.25 dB) to 4.2 MHz	
Signal-to-Noise Ratio:	56 dB(1)	
Differential Phase:	2°	
Differential Gain:	2%(2)	
Transient Response:	1% K Factor (2T pulse)	
Correction Range:	Greater than 10 horizontal lines	
Memory Size:	12 horizontal lines	
Output Jitter:	Monochrome:	±10 ns
	Color:	±2.5 ns(3)
Picture-in-Shuttle:	Monochrome:	Continuous stabilization at all VTR shuttle speeds (300 in/s max)
	Color:	Continuous stabilization from stop up to the normal VTR play speed.

Table 1-3. TBC-2B Specifications (Continued)

VIDEO (Continued)		
VTR Interface:	Requires unprocessed video signal from nonsegmented helical-scan VTR	
Input Signals:	Tape Video:	1.0V ±2 dB composite video (75 ohm)
	Reference Video:	1.0V ±2 dB composite video or color black (loop through or 75 ohm)
	Dropout Signal In (Dropout compensator optional):	0.5 to 4V rf from VTR or TTL dropout pulse (dropout = low)
Output Signals:	Video Out 1:	1.0V composite video (75 ohm)
	Video Out 2:	1.0V composite or noncomposite video (75 ohm)
	Monitor Video Out:	1.0V composite video (75 ohm). Monitor video output is selected at the front panel by the MONITOR VIDEO OUT switch to provide processed TBC video or VTR video at the monitor video out jack.
	Sync Coherent subcarrier:	2 Vp-p sine wave at subcarrier frequency
	VTR Advanced Reference:	Composite sync at color video level (75 ohm) or TTL level or vertical drive at TTL level (jumper selectable)

(1) VTR-TBC system signal-to-noise ratio is determined primarily by VTR performance, e.g., 47 dB VTR S/N = 46.5 dB System S/N. This gives an equivalent TBC S/N ratio of 56 dB.
(2) Measured using a nonsynchronous, subcarrier, modulated ramp with subcarrier amplitude equal to that of the color burst.
(3) Output jitter is directly dependent on the S/N of the input signal. Specification based on an input S/N of 47 dB.

SECTION 2
INSTALLATION

2-1. INTRODUCTION

This section contains information for unpacking, inspecting, mounting, and system interconnection of the TBC-2B.

2-2. UNPACKING

The TBC-2B is shipped from the factory in a specially constructed packing case. Caution should be exercised in unpacking to prevent damage to the cabinet finish or accessory parts. Check the contents of the packing case and packing materials for accessory items. Check all items against the packing list to ensure the shipment is complete. Carefully examine the contents for damage that may have occurred during shipment. Notify the carrier and the Ampex representative of any shortage or damages.

2-3. LOCATION

The area chosen for the location of the TBC-2B should be adequately ventilated and relatively dust-free. The area should not be close to any strong electromagnetic fields. Common sources of interference include fluctuating loads on nearby high-voltage lines, heavy-duty transformers, elevator motors, and ratio transmitting equipment. The unit should be mounted in a cabinet that is located in a vibration-free environment. Allow sufficient space at the top and rear of the unit for a flow of cooling air. Space is required at the rear of the TBC-2B for making signal connections at the connector panel.

2-4. INSTALLATION

The TBC-2B is designed so that it may be conveniently mounted in a cabinet, console, or standard 19-inch (48.6 cm) rack. To install, remove TBC-2B from its shipping container and refer to the following applicable paragraph.

2-5. Console Installation

Using eight screws, as shown in Figure 2-1, mount TBC-2B chassis directly into console.

2-6. Cabinet Installation

Using four screws, as shown in Figure 2-1, install the two support brackets (Ampex Field Kit No. 1409135) at the rear of the cabinet to align with the supports on each side of the TBC-2B chassis. Slide TBC-2B chassis on support brackets and, using eight screws as shown in Figure 2-1, mount TBC-2B directly into the cabinet.

2-7. Rack-Mount Installation

Using four screws, as shown in Figure 2-1, install the two support brackets (Ampex Field Kit No. 1409136) at the rear of the rack to align with the supports on each side of the TBC-2B chassis. Slide TBC-2B chassis on the support brackets and, using eight screws as shown in Figure 2-1, mount TBC-2B chassis directly into the rack.

2-8. POWER AND SIGNAL CONNECTORS

All connections to and from the TBC-2B are made to connectors at the rear of the TBC-2B. Figure 2-2 is a rear view of TBC-2B showing the location of the power and signal connectors.

2-9. AC Power Connections

Main power is connected to the TBC-2B through a captive power cable connected to the power supply assembly. The main transformer has multiple taps

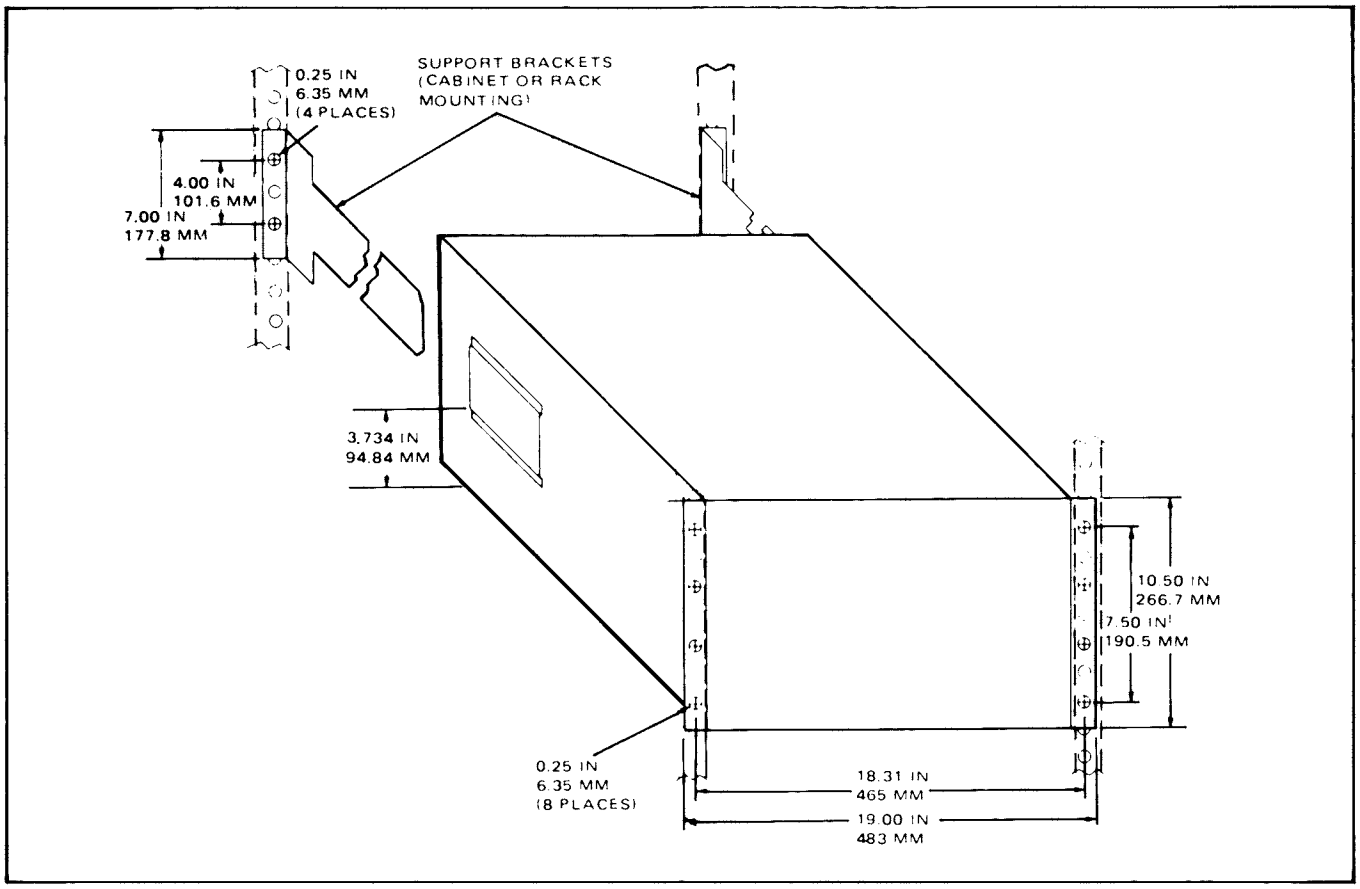


Figure 2-1. Installation Drawing

that permit the TBC-2B to use any one of six nominal input voltage ranges between 95 Vac and 279 Vac.

A jumper plug arrangement, which is accessible at the rear of TBC-2B, allows the selection of the various input voltages. The jumper plugs are factory set to operate at 104-to-126 Vac. Line voltages should be checked prior to installation and, if required, the jumpers should be reset to correspond to the line voltage.

The line selector jumper plug J15 sets the TBC-2B to operate on either 115V (nominal) or 230V (nominal). When the number 115 printed on the back of the jumper plug is upright, 115V operation is selected. When the jumper plug is turned around and the number 230 is upright, 230V operation is selected. Placing the range jumper J16 to LOW, MEDIUM, or HIGH sets the voltages to the values within the range as indicated in Table 2-1. Install the line selector and range jumper plugs corresponding to the ac line voltage as shown in Table 2-1 or in the instructions located on the rear of the TBC-2B chassis adjacent to the power supply.

Table 2-1. Power Jumper Positions

LINE VOLTAGE	POWER JUMPER POSITIONS	
	LINE SELECTOR JUMPER	RANGE JUMPER
95-110	115	Low
104-126	115	Medium
114-140	115	High
190-220	230	Low
208-252	230	Medium
229-279	230	High

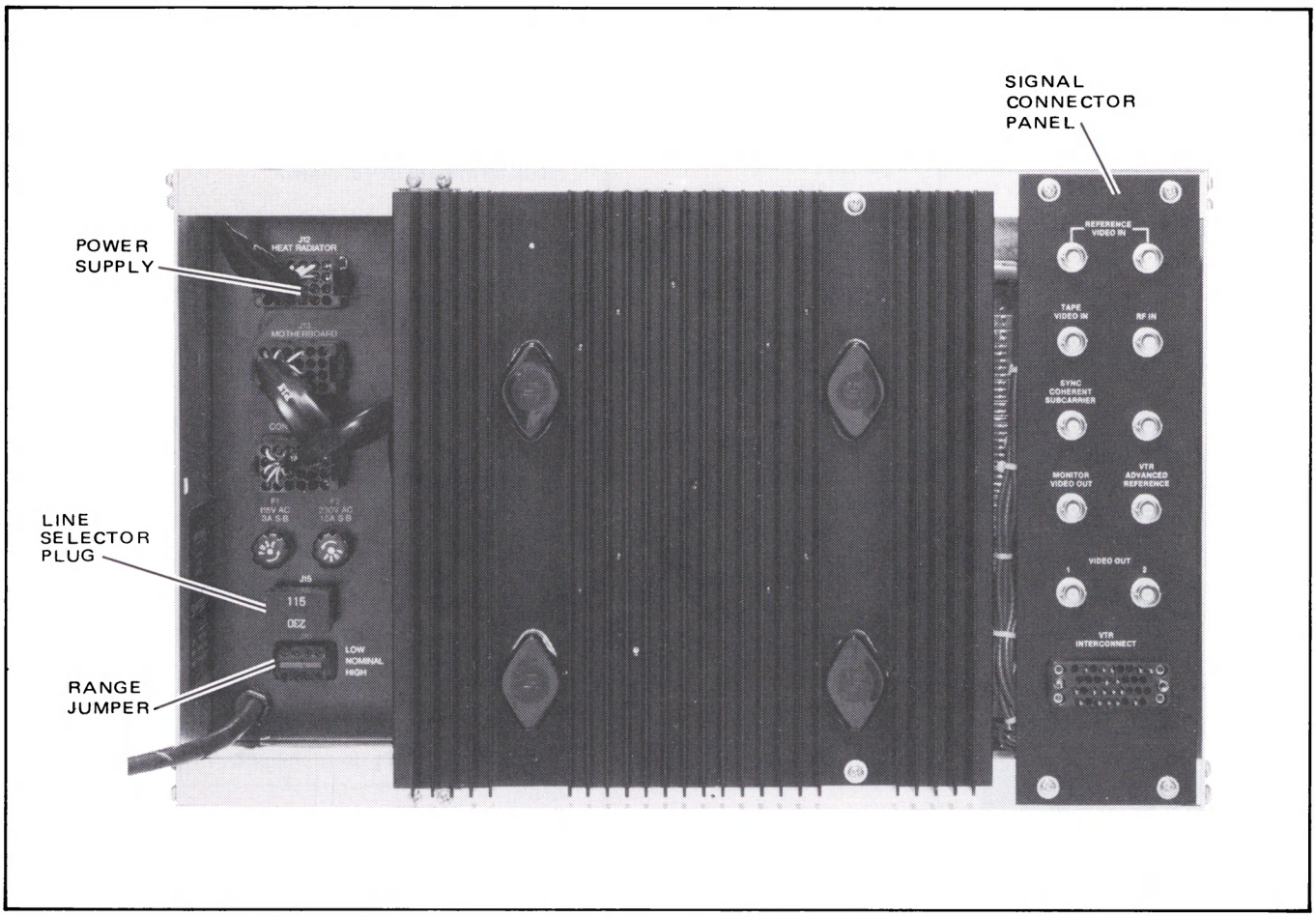


Figure 2-2. TBC-2B Rear View, Power and Signal Connector Panels

2-10. Signal Connections

All signal connections to the TBC-2B are made to BNC-type connectors and a 34-pin connector located on the rear connector panel. The 34-pin connector is used to interface the TBC-2B with the VPR-2B and the VPR-20. While the interface cable for the VPR-2B need not be modified, modification to the VPR-20 interconnect cable is necessary (see paragraph 2-24). The interconnect cable for the VPR-1 must also be modified (see paragraph 2-22) before connecting it to the TBC-2B. Cables and interface connectors that interface with the TBC-2B and external equipment must be supplied by the user. The video input and output cables should be Belden No. 8281 coaxial cable or equivalent. Table 2-2 is a listing of the signal connectors.

2-11. SYSTEM INSTALLATION

Typical system installation procedures are given in paragraphs 2-12 through 2-17. Install the TBC-2B using the appropriate procedure.

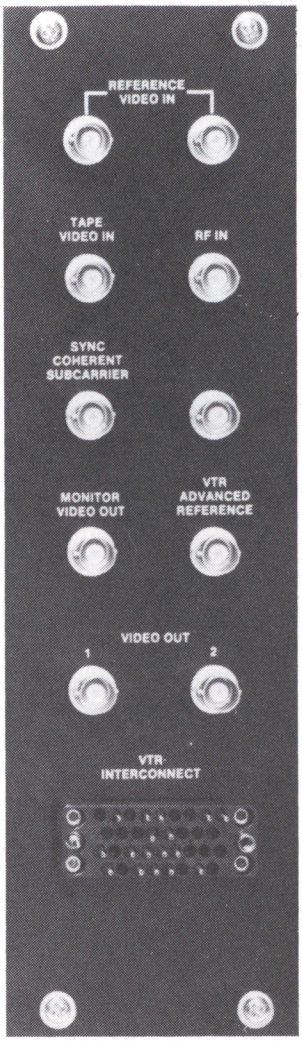
2-12. TBC-2B/VPR-2B and VPR-2 Installation

Prepare the TBC-2B for operation with the VPR-2B as follows:

1. Ensure that TBC-2B and VPR-2B power is off.

2. Interconnect the TBC-2B with the VPR-2B in accordance with Figure 2-3.

Table 2-2. Connector Panel Signal Description (Standard Configuration)



CONNECTOR	DESCRIPTION
REFERENCE VIDEO IN (2)	1.0V composite video or color black (loop-thru jacks terminate in 75 ohms)
TAPE VIDEO IN	1.0V composite video (75 ohm)
RF IN	Dropout signal input (RF level –0.5 to 4V, 2.5 to 10 MHz)
SYNC COHERENT SUBCARRIER	2.0 Vp-p nominal, 3.58-MHz internally derived from tape reference, 75-ohm unterminated.
MONITOR VIDEO OUT	1.0V composite video (75 ohm).
VIDEO OUT 1	1.0V composite video (75 ohm).
VIDEO OUT 2	1.0V composite or non-composite video (75 ohm).
VTR ADVANCED REFERENCE	Advanced composite sync, 0.3V nominal, sync polarity negative or advanced TTL-level composite sync or TTL-level, negative-going vertical drive.
VTR INTERCONNECT	(Used with VPR-1 or VPR-2)
pin A	Step Back
pin B	Step Back 2
pin C	Step Back - Signal Ground
pin D	Step Back 2 - Signal Ground
pin F	Sync Retard
pin J	Playback Vertical
pin L	Fast Shuttle
pin M	Playback Vertical - Signal Ground
pin N	Edit Mute (–)
pin P	Slow Motion
pin R	Head Switch/Vertical Dropout
pin S	Zero Offset
pin T	Head Switch/Vertical Dropout
pin U	2H Gate
pin V	Dropout Pulse
pin W	2H Gate - Signal Ground
pin X	Dropout Pulse - Signal Ground
pin Y	Up/Down
pin EE	Sync Head Process
pin JJ	Step Forward
pin NN	Step Forward - Signal Ground

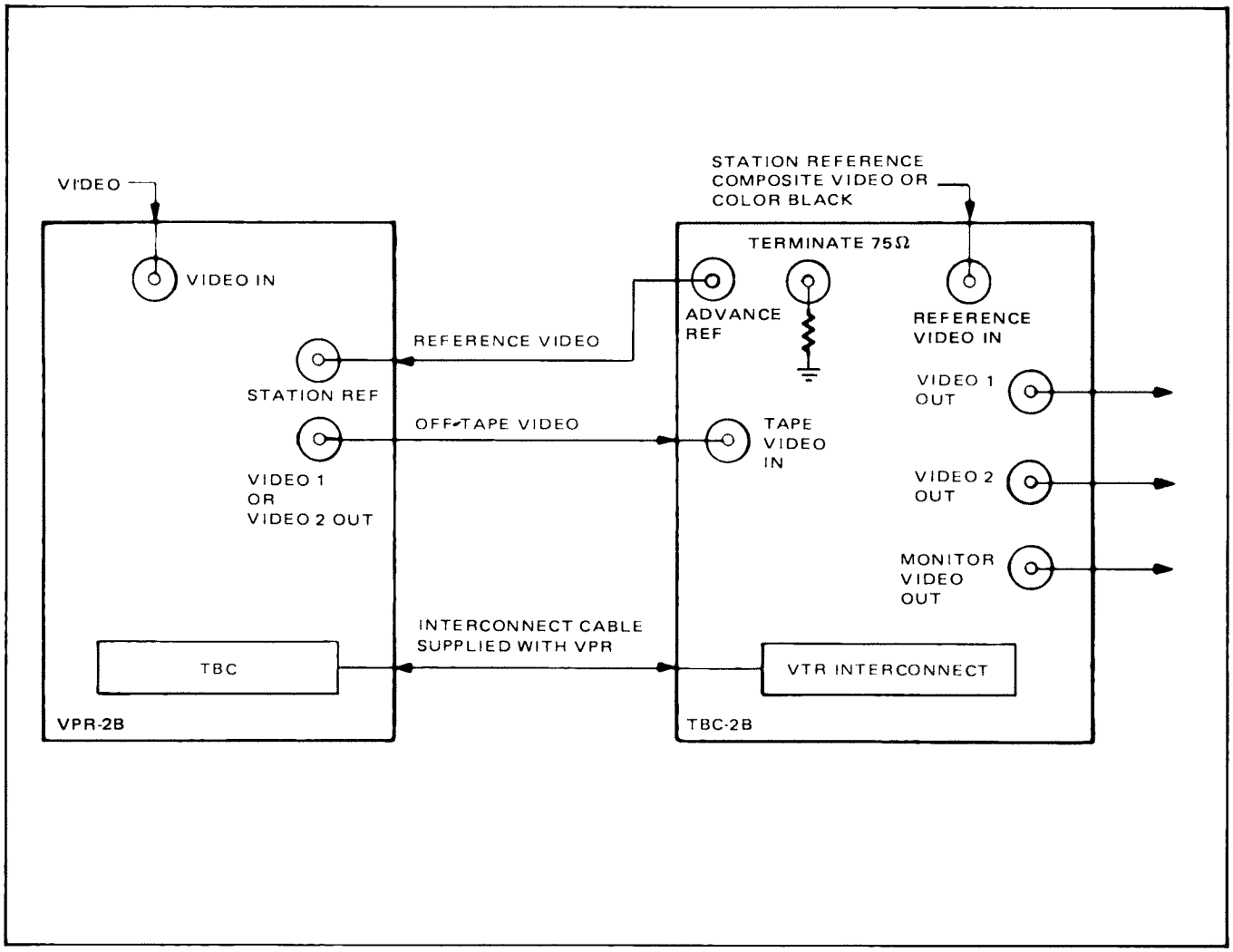


Figure 2-3. TBC-2B/VPR-2B Installation

3. Set the MODE switch on the front panel of the TBC-2B to NORMAL.

4. Set jumper J6 on the Tape VCO PWA 6 to the A–B position.

5. Set jumper J4 on the Tape VCO PWA 6 to the A–B position.

6. Set jumper J12 on the Tape VCO PWA 6 to the A–B position.

7. Set jumper J9 on the Tape VCO PWA 6 to the A–B position.

2-13. TBC-2B/VPR-20 Installation

Prepare the TBC-2B for operation with the VPR-20 as follows:

1. Ensure that TBC-2B and VPR-20 power is off.

2. Interconnect the TBC-2B with the VPR-20 in accordance with Figure 2-4.

3. Set the MODE switch on the front panel of the TBC-2B to NORMAL.

4. Set jumper J6 on the Tape VCO PWA 6 to the A–B position.

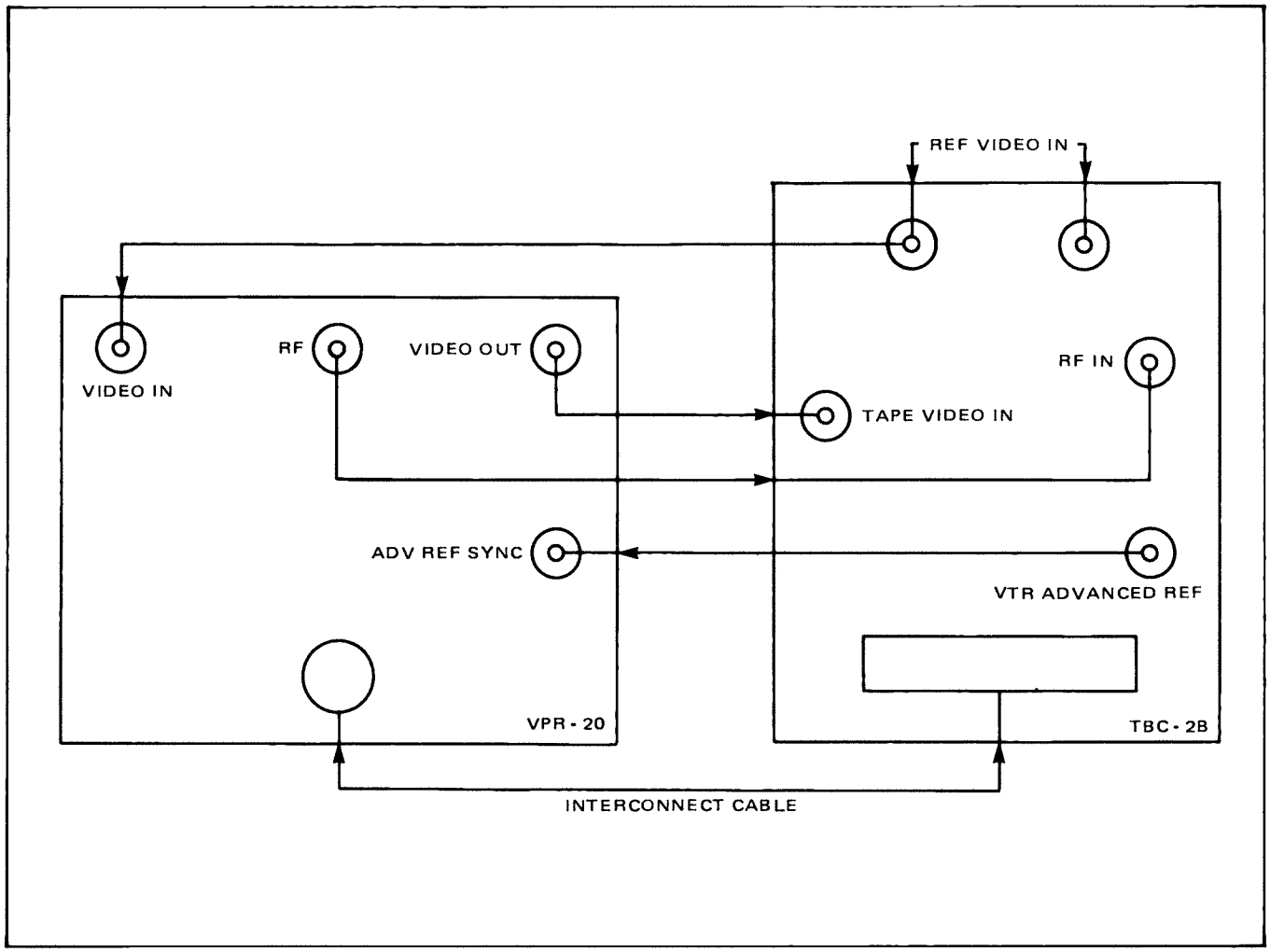


Figure 2-4. TBC-2B/VPR-20 Installation

5. Set jumper J9 on the Tape VCO PWA 6 to the A–B position.

6. Set jumper J12 on the Tape VCO PWA 6 to the A–B position.

7. Set jumper J4 on the Tape VCO PWA 6 to the A–B position.

8. If Serial-to-Parallel Converter with Dropout Compensator PWA 8 is installed in the TBC-2B, set jumper J2 on PWA 8 to position A–B.

9. If TBC/VPR-20 Interface Piggyback Board (kit no. 1460189) is installed on the Video Input Board PWA 3 in the TBC-2B, ensure that switch S1 (included with Interface Kit) is set to VPR position.

2-14. TBC-2B/Modified VPR-1 Installation

Prepare the TBC-2B for operation with the VPR-1 as follows:

1. Ensure that TBC-2B and VPR-1 power is off.

2. Modify the VPR-1 in accordance with the procedures of paragraphs 2-19 and 2-20 except that if the VPR-1 has had the shuttle kit installed, do not perform the procedure of paragraph 2-21.

3. Modify the VPR-1 interconnect cable in accordance with the procedure of paragraph 2-22. Interconnect the TBC-2B with the VPR-1 in accordance with Figure 2-5.

4. Set the MODE switch on the front panel of the TBC-2B to NORMAL.

5. Set jumper J6 on the Tape VCO PWA 6 to the A–B position.

6. Set jumper J12 on the Tape VCO PWA 6 to the A–B position (if tape being played has front porch dropout, use B–C position).

7. Set jumper J4 on the Tape VCO PWA 6 to the B–C position (if VPR-1 has shuttle kit installed, use A–B position).

8. Set jumper J6 on Tape VCO PWA to the A–B position.

2-15. TBC-2B/Direct Recovery Full Bandwidth VTR Installation

Prepare the TBC-2B for operation with a direct recovery full bandwidth VTR as follows:

1. Ensure that the VTR and TBC-2B power is off.

NOTE

Connect videotape recorder DROP-OUT PULSE output to RF IN or to pins V and X of the VTR INTER-CONNECT in accordance with the type of dropout signal supplied by the video-tape recorder.

2. Interconnect the TBC-2B in accordance with Figure 2-6.

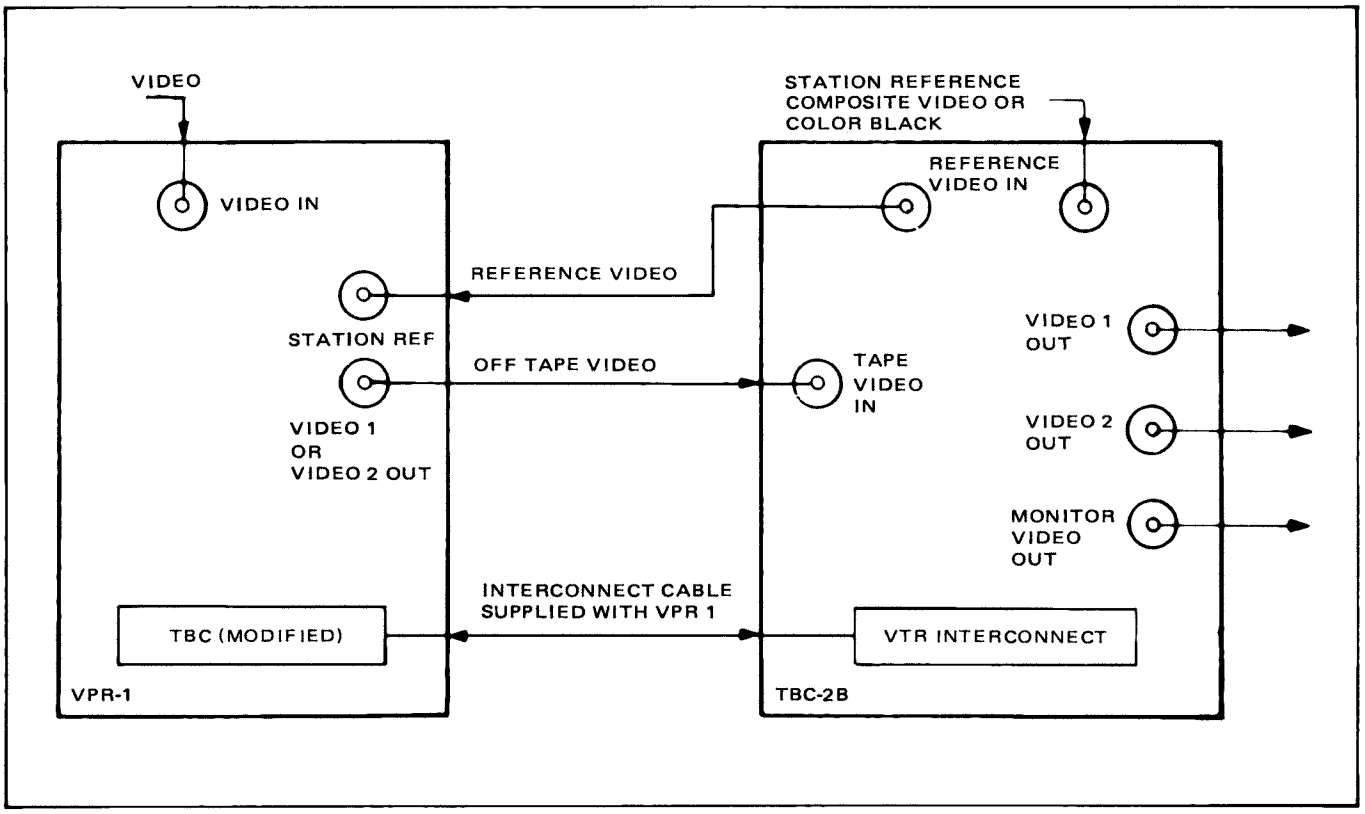


Figure 2-5. TBC-2B/Modified VPR-1 Installation

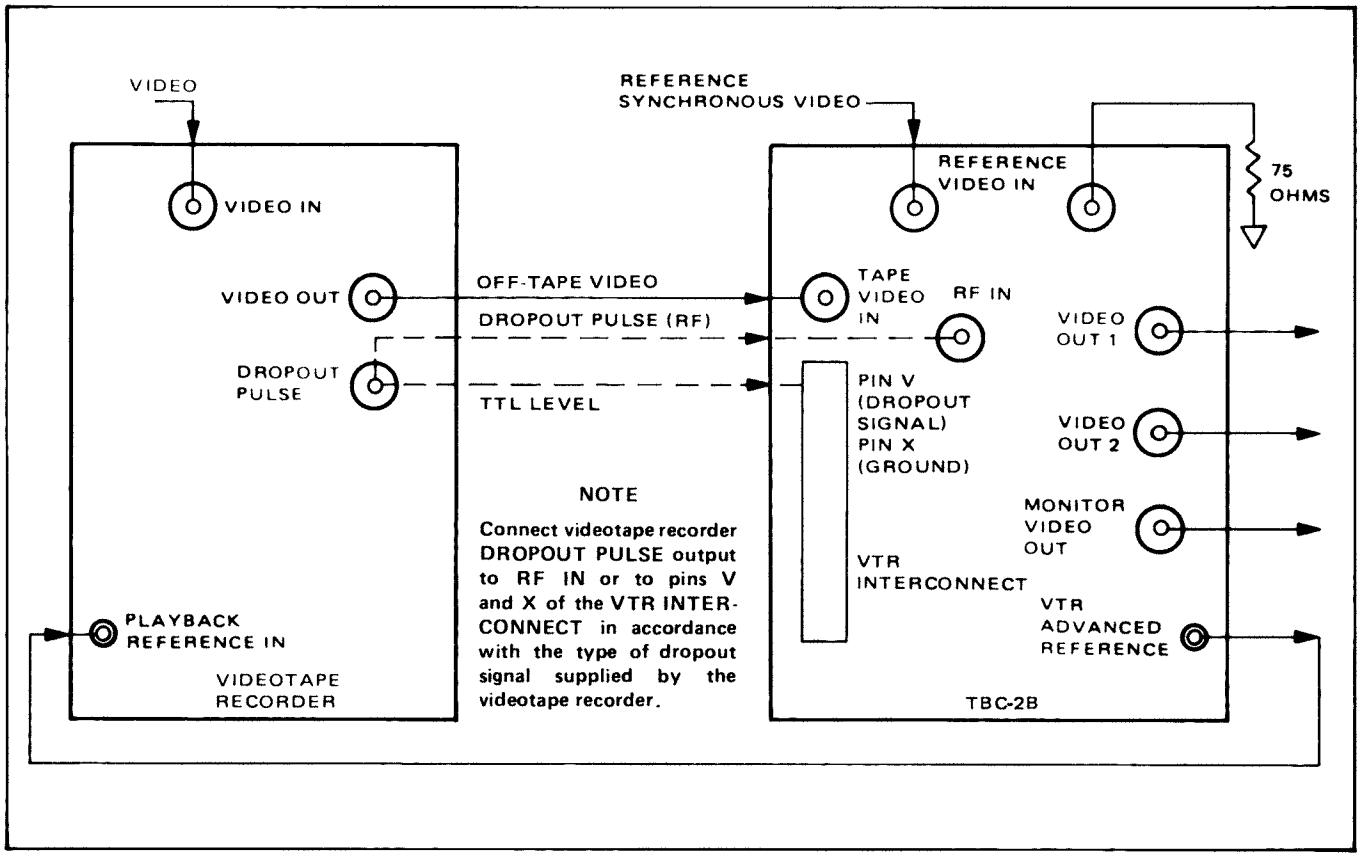


Figure 2-6. TBC-2B/Direct Recovery Full Bandwidth VTR Installation

3. If the VTR has a vertical lock drum servo, place jumper J3 on the Sync Generator PWA 15 to the A–B position. Otherwise, place jumper J3 to the B–C position.

4. Depending on the level of the VTR's ADVANCED REFERENCE signal from the TBC-2B that is required by the VTR, set jumper J4 on the Sync Generator PWA 15 in accordance with the following table.

LEVEL	JUMPER	POSITION
Video-level composite sync	J2	C–B
TTL-level composite sync	J2	A–B
TTL-level vertical drive	J2	D–B

5. Set jumpers on the Tape VCO PWA 6 in accordance with the following table.

JUMPER	POSITION
J4	B–C
J6	A–B
J9	A–B
J12	A–B (1)

(1) If tape has front porch dropout, set J12 to B–C.

2-16. TBC-2B/Single-Wire Heterodyne VTR Installation

1. Ensure that the VTR and TBC-2B power is off.

2. Interconnect the TBC-2B with the VTR in accordance with Figure 2-7.

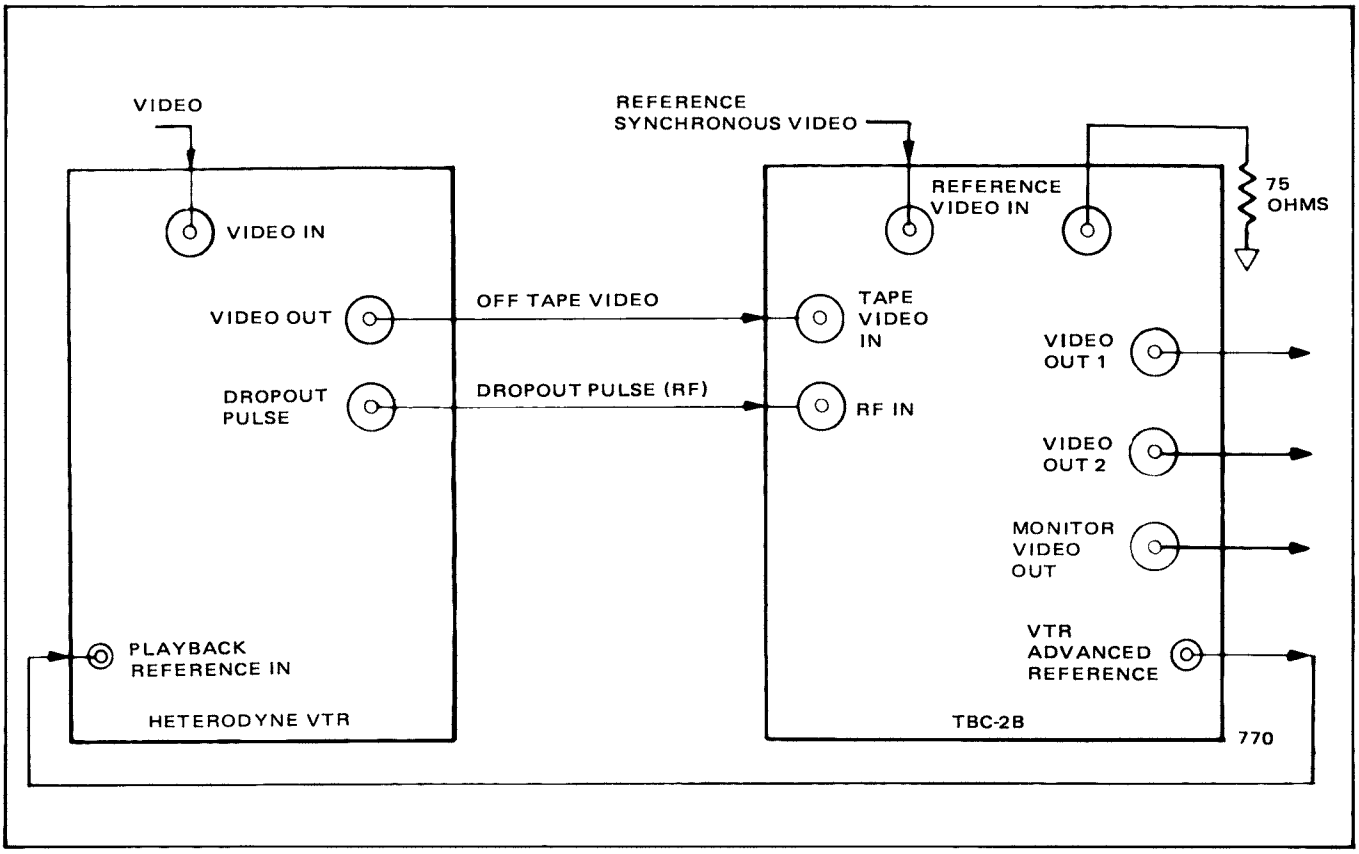


Figure 2-7. TBC-2B/Single-Wire Heterodyne VTR Installation

3. Place jumper J6 on Sync Generator PWA 15 to B–C position.

4. Depending on the level of the VTR ADVANCED REFERENCE signal from the TBC-2B that is required by the VTR, set jumper J4 on the Sync Generator PWA 15 in accordance with the following table.

LEVEL	JUMPER	POSITION
Video-level composite sync	J2	C–B
TTL-level composite sync	J2	A–B
TTL-level vertical drive	J2	D–B

5. Set jumper J6 on Tape VCO PWA 6 to A–B position.

6. Set the MODE switch on the front panel of the TBC-2B to HETERODYNE.

2-17. TBC-2B/Two-Wire Heterodyne VTR Installation

Prepare the TBC-2B for operation with a two-wire heterodyne VTR as follows:

1. Ensure that the VTR and TBC-2B power is off.

2. Interconnect the TBC-2B in accordance with Figure 2-8.

3. Place jumper J6 on the Sync Generator PWA 15 to the B–C position.

4. Depending on the level of the VTR ADVANCED REFERENCE signal from the TBC-2B that is required by the VTR, set jumper J4 on the Sync Generator PWA 15 in accordance with the following table.

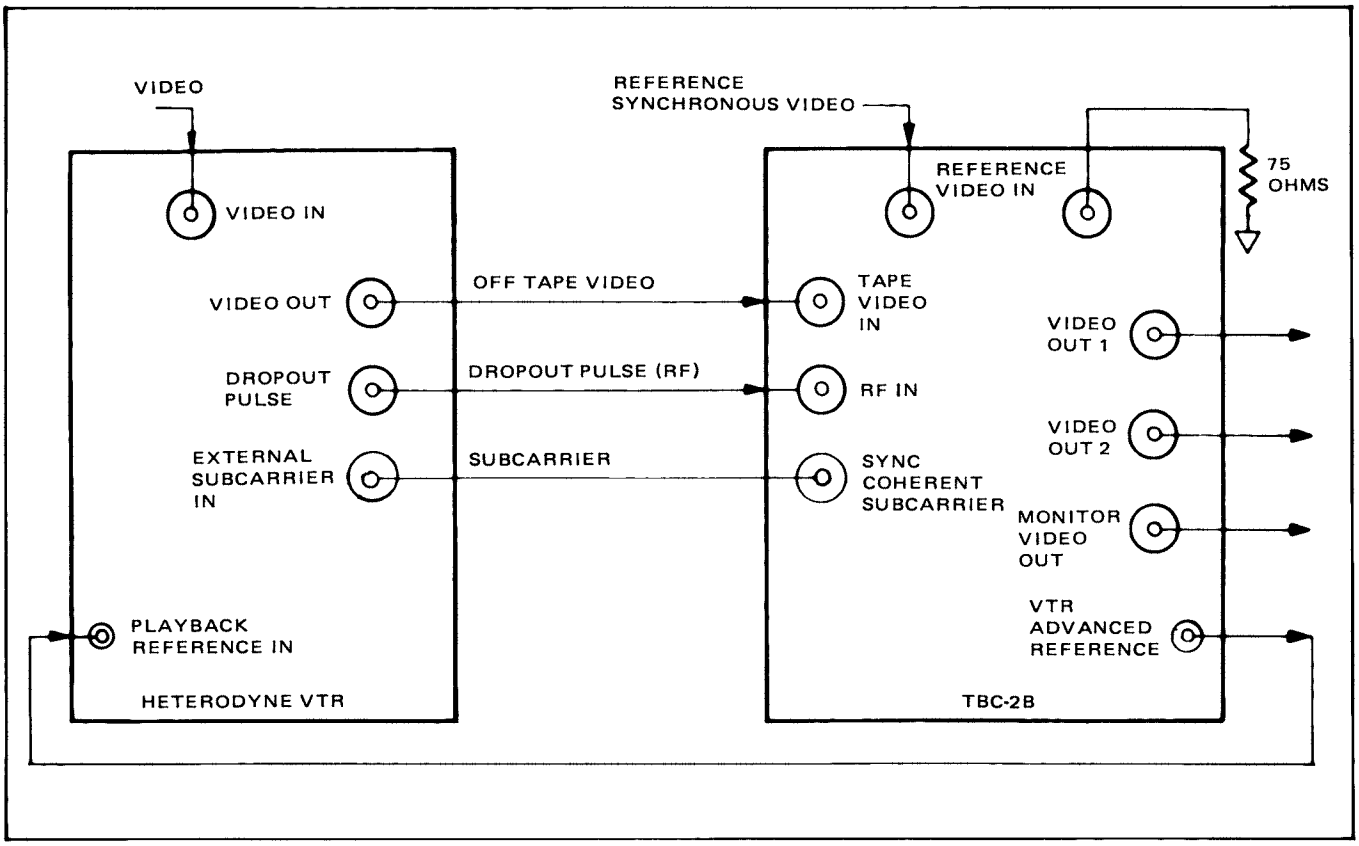


Figure 2-8. TBC-2B/Two-Wire Heterodyne VTR Installation

LEVEL	JUMPER	POSITION
Video-level composite sync	J2	C-B
TTL-level composite sync	J2	A-B
TTL-level vertical drive	J2	D-B

5. Set jumper J6 on the Tape VCO PWA 6 to the B-C position.

6. Set the MODE switch on the front panel of the TBC-2B to HETERODYNE.

2-18. COMPATIBILITY MODIFICATIONS

When installing a TBC-2B to operate in conjunction with a VPR-1, it is necessary to modify the VPR-1 and its interconnect cable. Modifications are required on the Playback Sync Processor PWA and the Control PWA in the VPR-1. The required modifications are described in paragraphs 2-19 and 2-20. After the required modifications have been made, realignment of the Reference PWA in accordance with the procedure of paragraph 2-21 is required. The procedure for modifying the interconnect cable is given in paragraph 2-22.

2-19. Playback Sync Processor PWA 6, Modification (SLO MO Step Command)

Modify the Playback Sync Processor PWA as follows:

1. With the VPR-1 power off, remove the Playback Sync Processor PWA 6, assembly no. 1378631, from the VPR-1.

2. On the Playback Sync Processor PWA, cut the trace connecting A19 pin 12 to PWA pin 39/40 at PWA pin 39/40.

3. Add a wire to connect A15 pin 5 to PWA pins 39/40.

4. Reinstall the Playback Sync Processor PWA in the VPR-1.

2-20. Control PWA 11, Modification (Sync Gen EE Offset)

Modify the Control PWA as follows:

1. Obtain the parts listed below.

QUANTITY	DESCRIPTION	AMPEX P/N
2	1N270 Diode	013-188
1	Contact Socket	166-199

2. With the VPR-1 power off, remove the Control PWA 11, assembly no. 1378625-01, -02, or -03.

3. Connect a diode (1N270, Ampex Part No. 013-188) from junction of A20 pin 4 and A26 pin 4 to PWA pin 90. Connect diode so that anode is connected to PWA pin 90.

4. Connect a diode (1N270, Ampex Part No. 013-188) from junction of A26 pin 6 and PWA pin 64 to PWA pin 90. Connect diode so that anode is connected to PWA pin 90.

5. Reinstall the Control PWA in the VPR-1.

6. Modify the VPR-1 motherboard by removing the wire connecting XA6-Gnd to I/O TBC connector J5 pin S. Add a wire from XA11 pin 90 to I/O TBC connector J5 pin S. Use socket contact (Ampex Part No. 166-199) at J5 pin S.

2-21. Reference PWA 7 Realignment, Sync Advance

Adjust the Reference PWA as follows:

1. With the VPR-1 power off, remove the Reference PWA 7, and place it on an extender and reinstall in slot 7.

2. Connect channel A of a dual trace oscilloscope to the reference input signal (PWA pin 13/14).

3. Connect channel B of oscilloscope to the VIDEO OUT connector on the rear of the VPR-1. Turn on VPR-1 power.

4. Trigger oscilloscope from TP11 on Reference PWA 7.

5. Adjust potentiometer R82 on the Reference PWA 7 so that the video output signal leads the reference input signal by 5-1/2 lines. Note that potentiometer R82 adjusts advance in 1/2-line increments. Therefore, adjust potentiometer R82 for 5-1/2 line advance and then center potentiometer R82 one-half way between the two jump points.

6. Turn off VPR-1 power. Remove Reference PWA 7 from the extender and replace the Reference PWA 7 in the VPR-1.

2-22. VPR-1 Interconnect Cable Modification

Modify the VPR-1 interconnect cable for use with the TBC-2B as follows:

NOTE

The VPR-1 interconnect cable has two connectors, P5 and P11. The end of the cable terminated with plug P5 is marked MATES WITH VTR. The end of the cable that is terminated with connector P11 is marked MATES WITH TBC.

1. Identify the wire that connects P5 pin D to pin 11 pin C and disconnect it at P11 pin C. Reconnect this wire to P11 pin D.

2. Identify the wire that connects P5 pin J to P11 pin H and disconnect it at P11 pin H. Reconnect this wire to P11 pin S.

3. Identify the wire that connects P5 pin S to P11 pin X and disconnect it at P11 pin X. Reconnect this wire to P11 pin S.

4. Using a 60-inch long 24 AWG wire, connect P5 pin EE to P11 pin EE. Use pin contact (Ampex Part No. 166-224) and socket contact (Ampex Part No. 166-226) for connections.

5. Using a 60-inch long 24 AWG wire, connect P5 pin LL to P11 pin LL.

6. Remove wire connecting P5 pin V to P11 pin V and remove wire connecting P5 pin X to P11 pin X. Replace these wires with 24 AWG shielded cable. Connect the center conductor of the shielded cable from P5 pin V to P11 pin V. Connect the shield of the shielded cable from P5 pin X to P11 pin X.

2-23. TBC-2B/VPR-2B Interconnect Cable

The TBC-2B/VPR-2B interconnect cable, assembly no. 1378507, interconnects the VPR-2B to the TBC-2B without modification. A pin-out diagram of the interconnect cable is provided in Figure 2-9.

2-24. TBC-2B/VPR-20 Interconnect Cable

When interconnecting the TBC-2B with the VPR-20, it is necessary to add a jumper wire from pin 27 to pin 25 on the pin face of cable connector body (part no. 206039). A pin-out diagram of the interconnect cable can be found in Figure 2-10.

2-25. PREOPERATIONAL PROCEDURE

After the TBC-2B is installed and connected to the associated VTR, perform the following procedure:

1. Set MODE SELECT switch on the front panel to HETERODYNE position if the playback signal is heterodyne video (playback of heterodyne video through the TBC-2B is possible only if the optional Color Processor PWA 2 has been installed in the TBC-2B), or to NORMAL position if the playback signal is direct color or monochrome.

2. Set Velocity Compensator switch and Drop-out Compensator switch, which are located on PWA's 13 and 8 respectively, to the ON position as required.

3. Connect a 1 Vp-p color-bar signal to the input of the VTR. Apply power to the VTR and the TBC-2B. Place the VTR in the standby (stop) mode.

4. Connect a waveform monitor or oscilloscope to the video output connector of the VTR. Use a 75-ohm termination at the input of the monitor or scope. Verify that the signal level is 1 Vp-p (unit gain).

5. Record and play back a 1-minute segment of the color-bar signal. The color-bar signal during playback should have a 1-Vp-p amplitude with correct chroma levels. If the color-bar signal is not correct, adjust the VTR.

6. Connect a waveform monitor or scope to VIDEO OUT 1 on the TBC-2B. Use a 75-ohm termination at the input of the monitor or scope. Check that the burst and sync levels are 0.286 Vp-p. If they are not, refer to the burst and sync level adjustment procedure given in the following paragraph.

2-26. Burst and Sync Level Adjustment

Burst and sync levels should be adjusted only if they do not conform to the specifications of step 6 of the *Preoperational Procedure*, paragraph 2-25. Adjust burst and sync levels as follows:

1. Connect a flat field with 0% APL test signal from video source in E-E mode of operation, to TAPE VIDEO IN connector of TBC-2B.

2. With power off, remove the Video Output PWA 14, place it on an extender board and insert into position 14. Reapply power.

3. Connect oscilloscope channel A with 75-ohm termination, to pin 59/60 (video out).

4. Trigger oscilloscope from REF sync at pin 49.

5. Adjust R192 (sync level) for sync level of 286 mVp-p.

6. Adjust R221 (burst level) for burst level of 286 mVp-p.

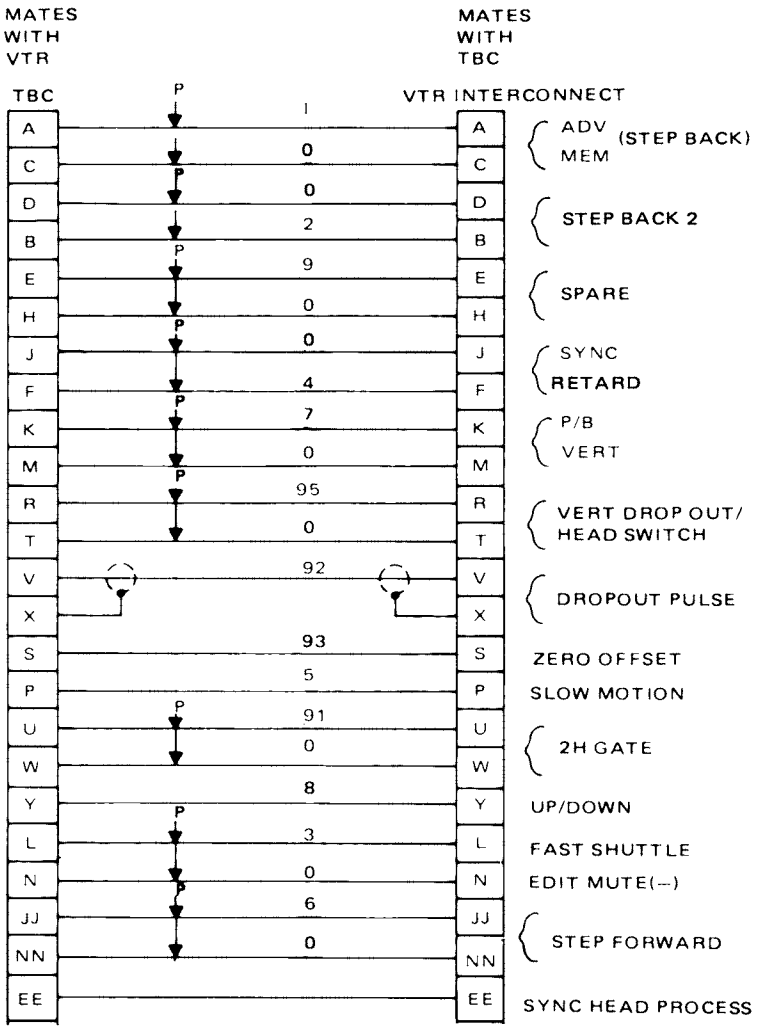


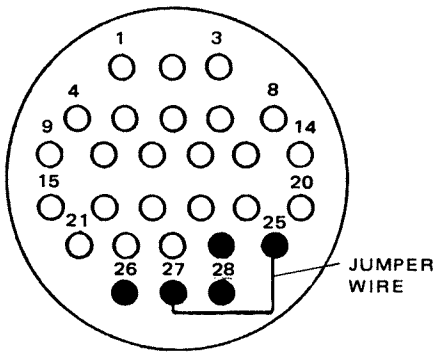
Figure 2-9. TBC-2B/VPR-2B Interconnect Cable, Assembly No. 1378507

7. Adjust R206 (burst balance) for symmetrical burst with respect to blanking.

8. With power off, remove PWA from extender, remove extender from position 14 and reinsert PWA into position 14.

2-27. Video and Black Level Unit Adjustment

Check the video and black levels with the VIDEO LEVEL and BLACK LEVEL potentiometer/switch in the "in" position. Check the levels as follows:



PIN FACE OF CONNECTOR BODY
(MATES WITH VPR-20)

	AMP P/N	AMPEX P/N
CONNECTOR BODY	206039-1	167-487
CABLE CLAMP	206070-1	167-092
PINS 28-24 AWG*	66507-9	167-721
PINS 24-20 AWG*	66506-9	167-477
PINS 18 AWG MAX	66570-3	167-685

*USE CRIMPER NO. 90302-01

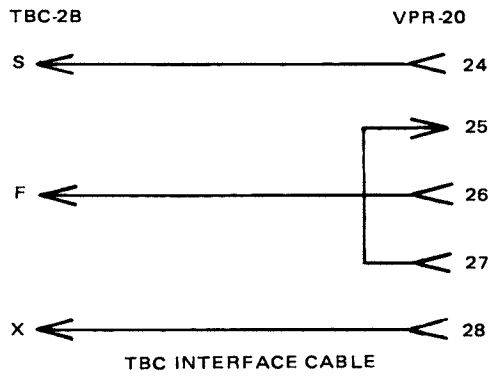


Figure 2-10. TBC-2B/VPR-20 Cable Pin-Out Diagram

1. Record and play back a 1-minute segment of color-bar signal.

2. Connect a waveform monitor or scope to the VIDEO OUT 1 jack on the TBC-2B. Use a 75-ohm termination at the input of the monitor or scope. While playing back the tape, check that the video level and black level are correct.

3. If the levels are incorrect, adjust VIDEO LEVEL and BLACK LEVEL trim controls on the front panel of the TBC-2B.

2-28. Chroma Phase Unity Adjustment

Using a tape that is recorded with the correct burst-to-chroma phase, place the CHROMA PHASE potentiometer/switch in the "in" (unity) position and check for correct phase as follows:

1. Connect a vectorscope to the VIDEO OUT 1 jack on the TBC-2B. Use a 75-ohm termination at the input to the vectorscope.

2. While playing back the tape to be corrected, adjust the vectorscope phase control to place the burst color vector at the correct point on the polar display.

3. Adjust CHROMA PHASE trim control, located on the front panel of the TBC-2B, to place the color vectors at the correct points on the display.

2-29. SYSTEM PHASE ADJUSTMENT

To permit synchronous operation of the recorder and the TBC-2B system with another color source, the TBC-2B output signal may be adjusted to match the phase of the external signal as follows:

1. Connect a dual-trace scope to the video output of the TBC-2B and to the video output of the external signal source. Use 75-ohm termination at the input of the scope.

2. Adjust the scope display for one horizontal line.

3. Record a 1-minute segment of tape. While playing back the tape, adjust the HORIZ PHASE control on the TBC-2B control panel to line up the leading edges of the two sync signals as close as possible. Note: Adjusting HORIZ PHASE causes H-sync to move in cycles of subcarrier.

4. Disconnect scope.

5. Connect a dual-trace vectorscope to the video output of the external signal source and the video output of the TBC-2B. Use 75-ohm terminations at the input of the vectorscope.

6. Record a color-bar segment of tape. While playing back tape, adjust the SUBCARRIER PHASE control on the TBC-2B to superimpose the burst vectors.

7. While playing back the recording made in step 6, adjust CHROMA PHASE control to superimpose the color-bar vectors. (Note: The CHROMA PHASE control is used to compensate for recordings made with the improper color phase.)

2-30. OPERATION VERIFICATION

Use the following procedures to verify that the TBC-2B is operating correctly.

2-31. Normal Playback Verification

The following procedure verifies system performance in the normal mode of operation. Proceed as follows:

1. Connect vectorscope channel A to VIDEO OUT connector on the rear of the TBC-2B. Trigger vectorscope from burst.

2. Set MODE switch on the front panel of the TBC-2B to NORMAL and record and play back a color-bar signal in normal mode. During playback, adjust R3 and R4 on the Tape H Comparator PWA 5 for minimum spread of color bars.

3. Connect oscilloscope channel 1 to TP12 of PWA 5. Trigger oscilloscope from line.

4. Adjust R108 on PWA 5 for 0 Vdc.

2-32. Slow Motion Verification

Use this procedure to check slow motion/still mode and reverse operation, and to perform system alignment under these conditions when necessary.

1. With power off, remove Color Processor PWA 2, install it on an extender board, and replace it in position 2. Apply power.

2. On the VPR-2B place the EE/TAPE switch to TAPE position and the transport in STILL FRAME playback of color bars.

3. Adjust R178 (Color Processor PWA 2) for minimum bounce on the vectorscope.

4. Adjust R223 (Color Processor PWA 2) for unity chroma gain.

5. With power off, remove the Color Processor PWA from the extender board and reinstall the PWA in position 2.

6. With power off, remove Tape-H Comparator PWA 5, install it on an extender board, and install it in position 5. Apply power.

7. Make a recording of RS170 A split field color bars at least 10 minutes long.

8. Rewind to the beginning and play back the VPR-2B in still mode.

9. Connect a digital voltmeter to TP12 (Tape-H Comparator PWA 5) and adjust R108 for 0.0V at TP12.

10. Connect the DVM to U44, pin 7 (Tape-H Comparator PWA). Play back the recording of the color bars on the VPR-2B in normal play speed. Adjust R1 (burst/sync phase) for 4.10 ±0.01V at U44-7.

11. Set R157 to midrange. Observe the TBC-2B VIDEO OUTPUT on the waveform monitor. Expand the rising edge of the I and Q signal of the split field (X25) and set this edge to a known position on the monitor for future reference.

12. Set the VPR-2B to STILL MODE. Adjust R170 for 4.10 ±0.01V at U44-7 and no picture shift on the waveform monitor.

13. Slowly bring the VPR-2B to full speed slow motion so as not to lose head-to-tape contact. Note the voltage at U44-7. Insure no picture shift. Slowly bring the VPR-2B to stop speed slow motion, and then to full reverse slow motion so as not to lose head-to-tape contact. Note the voltage at U44-7. Insure no picture shift.

14. If the voltages noted in the previous step are between 4.07 and 4.13 volts, then go to the next step. If not, with the VPR-2B in full speed reverse slow motion, adjust R157 for a voltage at U44-7 midway between the voltages noted in the previous step. Then repeat steps 11, 12, 13 until the voltage at U44-7 is between 4.07 and 4.13V.

15. Play back the VPR-2B in normal speed and note position of vectors on the vectorscope.

16. Play back the VPR-2B in full speed reverse slow motion. Adjust R155 for vectors in the same location as in play on the vectorscope.

17. Play back the VPR-2B in all speeds of slow motion: REVERSE, STILL, and FORWARD. Verify no picture shifts, no vector shifts, clean picture with no break-up, and correct colors. Verify with the VPR-2B sync head both off and on (VPR-2B board number 8).

18. With power off, remove the Tape-H Comparator PWA from the extender board and place it back in the frame.

2-33. Heterodyne Verification

Verify correct heterodyne operation of the system as follows:

1. With the TBC power off, remove Color Processor PWA 2, install it on an extender, and replace it in the TBC.

2. Connect a 75% color-bar test signal at standard level to the TAPE VIDEO IN connector.

3. Connect channel A of vectorscope to VIDEO OUT 1 connector.

4. Using loop-through at vectorscope, connect oscilloscope to VIDEO OUT 1 connector.

5. Trigger oscilloscope and vectorscope internally.

6. Alternately select HET and NORMAL positions of MODE switch and adjust R189 (clamp dc level) on the Color Processor PWA 2 for blanking in heterodyne to be the same as in normal.

7. Alternately select HET and NORMAL positions of MODE switch and adjust R193 (luminance level) on the Color Processor PWA 2 for luminance in heterodyne to be the same as in normal.

8. Alternately select HET and NORMAL positions of MODE switch and adjust R22 (chroma level) on the Color Processor PWA 2 for chroma amplitude in heterodyne to be the same as in normal.

9. With power off, remove PWA from the extender and replace PWA in position 2 of the TBC.

SECTION 3
OPERATION

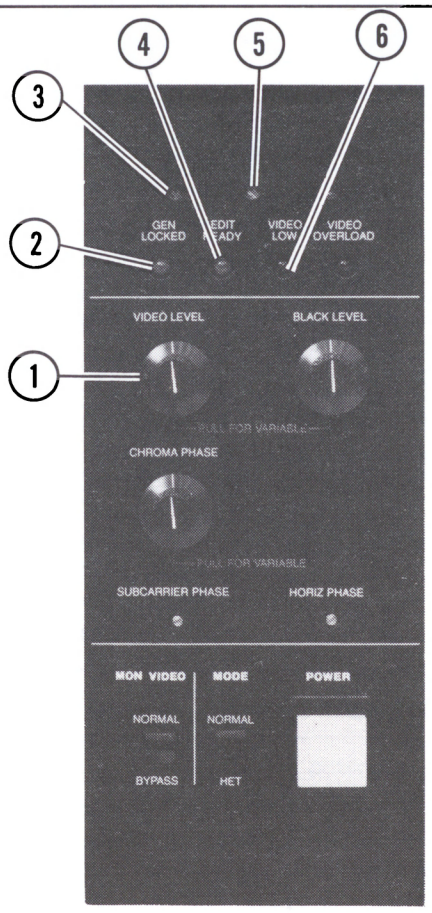
3-1. INTRODUCTION

This section provides a description of the controls and indicators used during normal operation of the TBC-2B and a routine operating procedure. Normally the controls are adjusted during the installation procedure to ensure unity gain and correct phase relationships and then no further adjustments are required.

3-2. CONTROLS AND INDICATORS

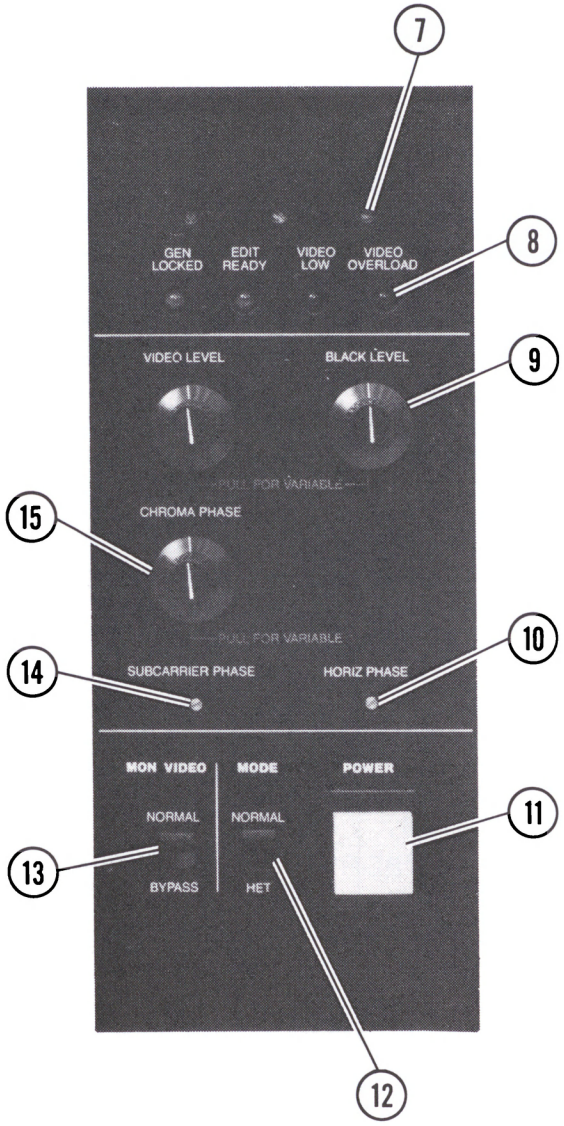
The controls and indicators used during normal operation of the TBC-2B and descriptions of their functions are contained in Tables 3-1 and 3-2. Secondary operator controls can be adjusted during playback to optimize the playback video. Maintenance controls have been factory set and should not be adjusted except for purposes of system maintenance.

Table 3-1. Operating Controls and Indicators, Front Panel Assembly



INDEX NO.	NAME	FUNCTION
1	VIDEO LEVEL potentiometer/switch	Adjusts the level of the video output signal. Push control "in" for unity gain.
2	GEN LOCKED indicator	Lights when the TBC-2B receives an acceptable gen lock reference signal.
3	"Unity" video level trim potentiometer	Adjusts the level of the video output signal with the VIDEO LEVEL potentiometer set to the unity gain position.
4	EDIT READY indicator	Lights when burst-to-sync phase relationship is within ±40° of RS170A specification.
5	"Unity" chroma phase trim potentiometer	Adjusts the phase of the picture chrominance information with respect to color burst during playback with the CHROMA PHASE potentiometer set to the unity gain position.
6	VIDEO LOW indicator	Lights when the video input signal level is less than 0.8 Vp-p nominal.

Table 3-1. Operating Controls and Indicators, Front Panel Assembly (Continued)



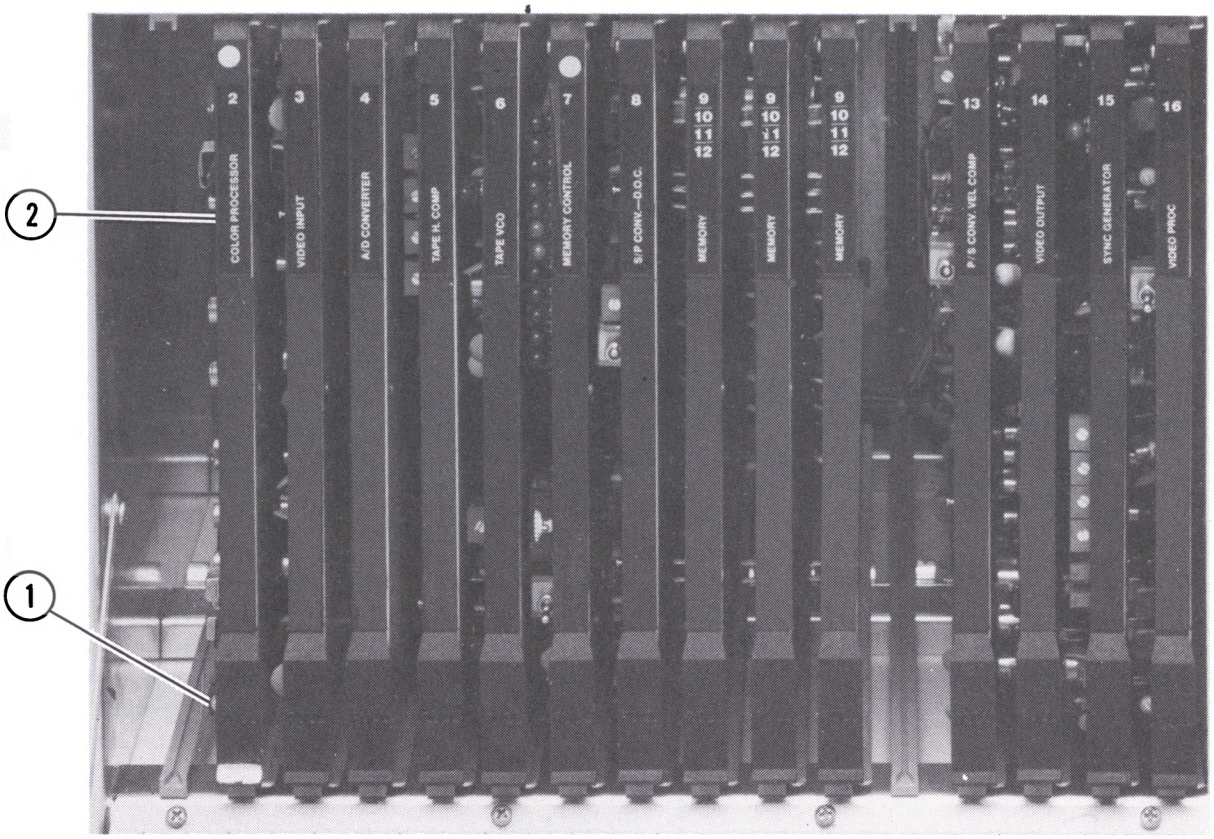
INDEX NO.	NAME	FUNCTION
7	"Unity" black level trim potentiometer	Adjusts the difference between the black and blanking level of the video output signal with the BLACK LEVEL potentiometer in the unity position.
8	VIDEO OVERLOAD indicator	Lights when the video input signal level is greater than 1.25 Vp-p nominal.
9	BLACK LEVEL potentiometer/ switch	Adjusts the difference between the black and blanking levels of the video output signal. Push control "in" for unity black level.
10	HORIZ PHASE trim potentiometer	Adjusts output video position relative to reference sync.
11	POWER switch/ indicator	Turn power to the TBC on and off. Lights when switch is in the ON position.
12	MODE switch	Selects processing of heterodyne video signal when the switch is in the HET position.
13	MON VIDEO switch	Selects monitor video output signal. In NORMAL position, processed TBC video is selected. In BYPASS position, the video input signal from the VTR is selected.
14	SUBCARRIER PHASE potentiometer	Sets color subcarrier phase of the VIDEO OUTPUT signal with respect to an external subcarrier. Used during fully synchronous operation to match color subcarrier phase to external signal sources.
15	CHROMA PHASE potentiometer/ switch	Adjusts the phase of the picture chrominance information with respect to color burst during playback. Push control "in" for unity chroma phase.

3-3. ROUTINE OPERATION

If standard input signals are supplied to the TBC-2B, the VIDEO LEVEL, BLACK LEVEL, and CHROMA PHASE controls may be left in their unity "in" position. If the input levels are not standard, pull the appropriate control to the "out" position and adjust control for the correct output level.

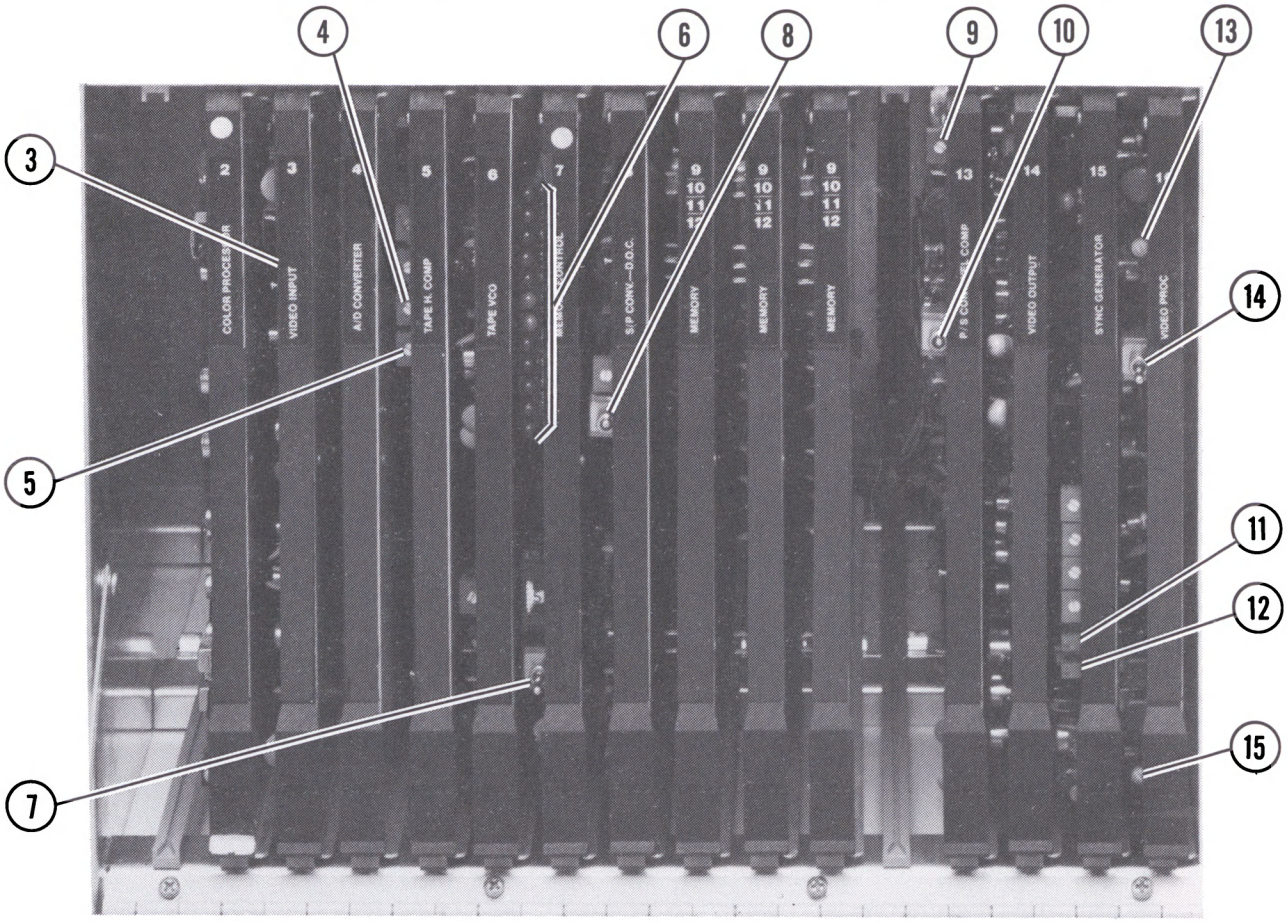
To obtain maximum performance of interchanged tapes and for checking system levels, it is suggested that a 1-minute segment of color bars be recorded at the beginning of each tape. The recorded segment provides a reference that the operator can later use to check the above levels and phase. If required, the controls may then be adjusted to provide an output signal with standard levels.

Table 3-2. Secondary Operating Controls and Indicators, Card Rack Assembly



INDEX NO.	NAME	FUNCTION
1	LUMIN LEVEL potentiometer R193 (PWA 2)	Adjusts signal level in the luminance channel of the color processor.
2	CHROMA LEVEL potentiometer R22 (PWA 2)	Adjusts signal level in the chroma channel of the color processor.

Table 3-2. Secondary Operating Controls and Indicators, Card Rack Assembly (Continued)



INDEX NO.	NAME	FUNCTION
3	VIDEO IN GAIN potentiometer R6 (PWA 3)	Provides +2 dB gain adjustment of input video. Control is adjusted only if VIDEO LOW or VIDEO OVERLOAD indicator is lit. This control should be used only if input video level cannot be adjusted to correct level.
4	ϕ MOD GAIN potentiometer R3 (PWA 5)	Adjusts gain of phase modulator. Adjust for smallest vector spread.
5	VEL BAL potentiometer R4 (PWA 5)	Adjusts balance of velocity loop. Adjust for smallest vector spread.
6	16-Line Indicators (PWA 7)	The 16-line indicators correspond to 16 lines of memory storage. The eighth LED from the top is green and others are red. When the green LED is illuminated, normal playback operation is indicated. When any of the first seven from the top are illuminated, memory read overload is indicated and memory is being

Table 3-2. Secondary Operating Controls and Indicators, Card Rack Assembly (Continued)

INDEX NO.	NAME	FUNCTION
6 (Continued)	16-Line Indicators (PWA 7) (Continued)	read faster than VTR can supply video lines. When any of the last eight LED's are illuminated, memory write overload is indicated and video lines from VTR are being written into memory faster than TBC is reading lines out. Constant illumination of the light adjacent to the green LED indicates an encoding difference between tape and reference input. Offset in addition to illumination of the green LED in vertical centering mode indicates advance of the video input signal.
7	VERTICAL/MEMORY CENTERING switch S1 (PWA 7)	In VERTICAL CENTERING position, the automatic reset function is not used. Output video is always correctly vertically positioned. In MEMORY CENTERING position, the automatic memory function is used with VTR's that have a 5-1/2 line advance. If video is not 5-1/2 lines advanced, final video output may be vertically mispositioned.
8	D.O.C. ON/OFF switch S1 (PWA 8)	Enables/inhibits operation of dropout compensation option.
9	GAIN potentiometer R1 (PWA 13)	Adjusts velocity compensator gain. Set for smallest blue vector dot.
10	VEL COMP ON/OFF switch S1 (PWA 13)	Enables/inhibits operation of the velocity compensation option.
11	CHROMA ϕ potentiometer R146 (PWA 15)	Provides vernier phase adjustment of reference 3.58 MHz to the velocity compensation option.
12	SUBCARRIER ϕ potentiometer R208 (PWA 15)	Provides vernier adjustment of subcarrier to the Video Output PWA.
13	CHROMA LEVEL potentiometer R35 (PWA 16)	Adjusts signal level in the chrominance channel of the video processor.
14	TAPE/NORMAL-SYNC GENERATOR REFERENCE switch S1 (PWA 16)	In the TAPE position, selects off-tape vertical sync to the Sync Generator PWA and processed video to the monitor. Used with non-servoed capstan VTR's in the NORMAL position, selects reference sync to the Sync Generator PWA and normal video to the monitor.
15	LUMIN LEVEL potentiometer R181 (PWA 16)	Adjusts signal level of the luminance channel of the video processor.

SECTION 4
MAINTENANCE AND AUXILIARY DATA

4-1. INTRODUCTION

This section contains a list of the TBC-2B's fuse complement and a jumper table that lists all of the jumpers used on the PWA's.

4-2. FUSES

Fuses used in the TBC-2B are listed in Table 4-1.

4-3. JUMPERS

Many PWA's used in the TBC-2B contain jumpers. A jumper is a length of wire or link that plugs into the component side of the PWA and electrically connects two points of the PWA's circuitry. Some jumpers may be set in two or more positions while others may only be plugged in or removed. They alter circuit operation by including or bypass portions of the PWA's circuitry. Many jumpers are used to alter the circuit to provide convenient test or alignment configurations of the circuit. Others provide the operator with alternative modes of system operation. Table 4-2 lists all of the jumpers used in the TBC-2B PWA's. The various positions in which the jumpers may be placed are given for each. Jumper placement for normal circuit operation is indicated. The effect on circuit operation of placing the jumpers in their alternative positions is also indicated.

Table 4-1. TBC-2B Fuse Complement

FUSE TYPE	FUNCTION	LOCATION
1.5A, slow blow	Prevents unit from drawing excessive line current. This fuse is in circuit only when line selector jumper is set for 230 Vac operation.	Mounted on rear of unit above the line selector jumper.
3A, slow blow	Prevents unit from drawing excessive line current. This fuse is in circuit only when line selector jumper is set for 115 Vac operation.	Mounted on rear of unit above the line selector jumper.
8A, fast flow	Prevents overcurrent in the +5 Vdc regulation selection of the unit's power supply.	Mounted inside the unit on the rear heat sink.

Table 4-2. Test Jumper Positions

PWA	JUMPER	POSITION	FUNCTION
A2 Color Processor Assy. 1405143	J1		
		A-B	Normal
		B-C	Test—fixed error voltage to crystal oscillator
Note: Jumpers J3, J4, J5, J12, and J13, do not appear on PWA 2.	J2		
		A-B	Normal
		B-C	Test—removes R-Y encoder
	J6		
		A-B	Normal
		B-C	Test—removes B-Y encoder
	J7		
		A-B	Normal
		A-C	Test—luminance low-pass filter alignment
	J8		
		A-B	Normal
		B-C	Test—luminance low-pass filter alignment
	J9		
		A-B	Normal
		B-C	Test—luminance low-pass filter alignment
	J10		
		A-B	Normal
		B-C	Test—luminance low-pass filter alignment
	J11		
		A-B	Normal
		B-C	Test—luminance low-pass filter alignment
	J14		
		A-B	Normal
		B-C	Test—remove chroma inverter
	J15		
		A-B	Normal
		B-C	Test—chroma invert delay filter alignment
	J16		
		A-B	Normal
		B-C	Test—chroma invert delay filter alignment
A3 Video Input Assy. 1405134	J1		
		Removed	Normal
		A-B	Low-pass filter alignment

Table 4-2. Test Jumper Positions (Continued)

PWA	JUMPER	POSITION	FUNCTION
A3 Video Input Assy. 1405134 (Continued)	J2		
		A-B	Normal
		Removed	Low-pass filter alignment
	J3		
		A-B	Normal
		Removed	Defeats clamp
	J4		
		A-B	Normal
		B-C	Test ramp
	J5		
		A-B	Normal
		Removed	Defeats noise detector
	J6		
		A-B	Normal
		Removed	Defeats vertical inhibit
	J7		
		A-B	Normal mute
		Removed	Defeats video mute
A4 A/D Converter Assy. 1409108	No jumpers		
A5 Tape H Comparator Assy. 1409104	J1		
		A-B	Normal
		B-C	Test—inserts fixed error voltage
	J2		
		A-B	Normal
		B-C	Test—inserts variable dc test error voltage
A6 Tape VCO Assy. 1409101	J1		
		A-B	Normal
		B-C	Forces search condition
		B-D	Forces search condition
	J2		
		A-B	Normal
		B-C	Inserts test voltage for search oscillator
	J3		
		A-B	Normal
		Removed	Removes error to normal oscillator

Table 4-2. Test Jumper Positions (Continued)

PWA	JUMPER	POSITION	FUNCTION
A6 Tape VCO Assy. 1409101 (Continued)	J4		
		A-B	Normal, remote selection of up/down oscillator
		B-C	Auto selection of up/down oscillator
	J5		
		A-B	Normal
		B-C	Test—forces VCO phase comparator
	J6		
		A-B	Single-wire heterodyne operation
		B-C	Two-wire heterodyne operation
	J7		
		A-B	Normal
		B-C	Test—defeats H reset
	J8		
		A-B	Normal
		Removed	Test—verifies reset qualify counter
	J9		
		A-B	Sync head video processing
		B-C	Normal
	J10		
		A-B	Normal
		Removed	Disables tape vertical to vertical delay
	J11		
		A-B	Normal
		Removed	Disables VPR vertical to vertical delay
	J12		
		A-B	Back porch dropout operation
		B-C	Front porch dropout operation
A7 Memory Control Assy. 1409094	J1		
		A-B	Normal
		Removed	Test—disconnects overload bus
	J2		
		A-B	Normal
		Removed	Test—disables dual load
	J3		
		A-B	Normal
		Removed	Test—disconnects overload bus

Table 4-2. Test Jumper Positions (Continued)

PWA	JUMPER	POSITION	FUNCTION
A7 Memory Control Assy. 1409094 (Continued)	J4		
		A-B	Normal
		B-C	Test—forces slow motion
	J5		(Not used)
	J6		
		B-C	Used with One-Line DOC (NTSC)
		A-B	Used with Two-Line DOC (PAL/SECAM)
	J7		
		A-B	Normal
		Removed	Test—inhibits write address from advancing
A8 S/P Converter Assy. 1409122	No jumpers		
A8 S/P Converter with DOC Assy. 1409140	J1		
		A-B	Normal
		B-C	Data disable
	J2		
		A-C	RF dropout enable (VPR-20)
		A-B	TTL dropout enable
A9, A10, A11 Memory A, B, C Assy. 1409107	No jumpers		
A13 P/S Converter with Velocity Compensator Assy. 1409125	J1		
		A-B	Normal
		B-C	Test—forces memory overload condition
	J2		
		A-B	Normal
		Removed	Disconnects second order correction
	J3		
		A-B	NTSC—5-1/2 line advance
		B-C	PAL/SECAM—7-1/2 line advance
	J4		
		A-B	PAL/SECAM
		B-C	NTSC
	J5		
		A-B	Normal
		B-C	Test—inserts fixed error voltage

Table 4-2. Test Jumper Positions (Continued)

PWA	JUMPER	POSITION	FUNCTION
A13 P/S Converter with Velocity Compensator Assy. 1409125 (Continued)	J6		
		A-B	16-line memory (PAL/SECAM)
		B-C	12-line memory (NTSC)
	J7		
		A-B	PAL/SECAM
		B-C	NTSC/PAL-M
A13 P/S Converter Assy. 1402396	No jumpers		
A14 Video Output Assy. 1405189	J1		
		RF connector	Test only—insert sweep to interpolation filter
	J2		
		A-B	Normal
		Removed	Test—removes clamp pulse
	J3		
		A-B	Normal
		Removed	Test—removes phase equalizer
	J4		
		A-B	Normal—black clip on
		Removed	Test—removes black clip
	J5		
		A-B	Normal—composite sync on VIDEO OUT 2
		Removed	No composite sync on VIDEO OUT 2
	J6		
		A-B	Normal
		B-C	Test—disables auto black
A15 Sync Generator Assy. 1405186	J1		
		A-B	VPR-20—5-1/2 line fixed advance
		B-C	U-MATIC Loop—servoed advance
	J2		Advanced reference output select
		A-B	Composite sync
		B-C	Composite sync (-8V)
		B-D	Vertical (-8V)
		B-E	Sync and burst

Table 4-2. Test Jumper Positions (Continued)

PWA	JUMPER	POSITION	FUNCTION
A15 Sync Generator Assy. 1405186 (Continued)	J3		Reference 3.58 MHz
		A-B B-C B-D B-E	Select jumper position as required for correct system operation
	J4		Subcarrier
		A-B B-C B-D B-E	Select jumper position as required for correct system operation
	J5		H-phase select
		A-B A-C	Select jumper position as required for correct system operation
	J6		
		A-B B-C	RS-170 standard Non-standard
A16 Video Processor Assy. 1405146	J1		
		A-D B-C	0° decode subcarrier 180° decode subcarrier
	J2		
		A-B B-C	Normal Test—fixed phase to decode subcarrier
	J3		
		Removed A-B	Normal Test—external test generator input
	J4		
		A-B B-C	Normal Test—eliminates R-Y encoded chroma
	J5		
		A-B B-C	Normal Test—eliminates B-Y encoded chroma
	J6		
		A-B B-C	Normal Test—alignment of luminance low-pass filter
	J7		
		A-B B-C	Normal Test—alignment of luminance low-pass filter

Table 4-2. Test Jumper Positions (Continued)

PWA	JUMPER	POSITION	FUNCTION
A16 Video Processor Assy. 1405146 (Continued)	J10		
		A-B	Normal
		B-C	Test—alignment of luminance low-pass filter
	J11		
		A-B	Normal
		B-C	Test—alignment of luminance low-pass filter

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